

Disposal of Electrophoresis Gels and Solutions



Overview

Electrophoresis gels are commonly used in molecular biology laboratories at Weill Cornell Medicine (WCM) for the identification of DNA. These gels will typically be agarose-based or polyacrylamide-based. The DNA identification process utilizes an organic fluorescence dye (e.g., ethidium bromide, propidium iodide, acridine orange, SYBR® Green) to stain the nucleic acids. **Ethidium bromide is the most commonly utilized dye throughout WCM and is a highly toxic and potentially mutagenic chemical that may be fatal if swallowed, inhaled, or absorbed through the skin.**

The waste by-products of the DNA identification process must be managed and disposed of in a manner that protects public health and the environment. This Update provides generators with the proper procedures for managing and disposing of electrophoresis gel wastes.

Applicability

This procedure applies to all laboratories and their personnel (“generators”) utilizing electrophoresis gels and solutions for the identification of DNA. This procedure does not pertain to wastes containing radiological or infectious agents, human blood, or other potentially infectious materials.

Responsibilities

Environmental Health and Safety (EHS) ensures that the information provided to the generators is reflective of current laws and regulations governing the disposal of these wastes and provides assistance and training as needed.

Principal Investigators and Laboratory Managers establish and administer policies and procedures to ensure that their personnel disposes of electrophoresis gels and solutions safely, responsibly, and as detailed in this Update.

Generators properly manage and dispose of electrophoresis gel wastes as established by this Update.

Procedure

Utilize the following procedures for each specific type of electrophoresis gel waste.

ELECTROPHORESIS GELS AND CONTAMINATED “NON-SHARP” LAB DEBRIS

- 1. COLLECT:** Collect electrophoresis gels and contaminated “non-sharp” lab debris (e.g., gloves, pads, towels, tubes, etc.) into a 5-gallon pail lined with a clear plastic liner. The 5-gallon pail utilizes a screw-top lid, which must remain closed at all times except when immediately adding or removing wastes from the container. Request a 5-gal bucket in the chemical waste request module at [Salute](#) from EHS.
- 2. LABEL:** Label each container with a [Hazardous Waste Label](#) (available from EHS or printable) with the waste constituents present in the pail by checking the appropriate box. The names of materials should be completely spelled out without abbreviations.
- 3. STORE** – Store the container in a placarded [Chemical Waste Satellite Accumulation Area](#) with secondary containment (e.g., tub or bin) to contain spills.
- 4. NO SHARPS:** No sharp items (e.g., large plastic pipettes, razor blades, etc.) are to be placed into the 5-gallon pails. See below for the proper means for disposing of contaminated sharps lab debris.
- 5. DISPOSE OF:** Once the 5-gallon pail is 75 - 80% full, complete and submit via the [Salute](#) Form available on the EHS website. An empty replacement pail will be provided at the time of the collection.



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Updated August 2022

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CONTAMINATED SHARPS LAB DEBRIS

Various types of sharp lab debris (e.g., razor blades, rigid plastic pipettes, etc.) may become contaminated with chemicals throughout the identification process. The contaminated sharps debris must be collected and disposed of properly.

1. **DECANT:** Decant any excess solutions into an applicable waste buffer or stock solution bottle.
2. **COLLECT:** Collect the contaminated sharps lab debris into a container with rigid walls to prevent puncture. The container must remain sealed/closed at all times except when immediately adding or removing wastes.
3. **LABEL "SHARPS":** Label (i.e., self-adhesive [hazardous waste label](#) available from EHS), store, and otherwise manage the waste container per WCM's [Chemical Waste Disposal Procedures](#). Be sure to indicate "SHARPS CONTAMINATE WITH ETHIDIUM BROMIDE" on the label.
4. **DISPOSE:** Once containers are 75 – 80% full, complete and submit the waste request via the [Salute](#) form available on the EHS website.

STOCK SOLUTIONS

Stock solutions typically contain higher concentrations of toxic chemicals. As such, stock solutions are unsuitable for treatment and must be submitted to EHS for disposal as detailed in WCM's [Chemical Waste Disposal Procedures](#).

1. **COLLECT:** Collect stock solutions into a sealable bottle/container. The bottle must remain sealed/closed at all times except when immediately adding or removing wastes from the bottle.
2. **LABEL:** Label (i.e., white self-adhesive [hazardous waste label](#) available from EHS – see above), store, and otherwise manage the waste container per the WCM's [Chemical Waste Disposal Procedures](#).
3. **DISPOSE:** Once containers are 75 – 80% full, complete and submit the waste request via the [Salute](#) form available on the EHS website.

SPENT BUFFER SOLUTIONS

Spent buffer solutions typically contain low concentrations (less than 0.01% by weight) of an organic fluorescence dye used in the identification process. **These solutions are not suitable for drain disposal without prior treatment.** The following are approved methods for treating the spent buffer solutions. Please note that laboratories may also choose to submit the spent buffer solutions to EHS for disposal, as detailed in WCM's [Chemical Waste Disposal Procedures](#).

Treatment via Adsorption for Organic Fluorescence Dyes

Filtering the spent buffer solutions (which are free of other non-organic contaminants, such as heavy metals) through a bed of activated charcoal or ion exchange resin is a relatively simple and effective method for removing toxic contaminants. This procedure is described in [Chemical Waste Disposal Procedures](#), section 10.12.5 Treatment Via Adsorption for Organic Fluorescence Dyes.

1. **DETERMINE:** Utilize the WCM's Drain and Trash Disposal of Chemicals procedure to determine if any of the spent buffer constituents other than the organic fluorescence dyes are not acceptable for drain disposal (e.g., heavy metals.) ***If a spent buffer contains any constituents other than the organic fluorescence dyes, which are not acceptable for drain disposal, then do not treat the waste.*** As detailed in WCM's Chemical Waste Disposal Procedures, manage the spent buffer solution as hazardous waste.
2. **ACCEPTABLE/FILTER:** If the spent buffer solution contains only constituents, other than organic fluorescence dyes, which are acceptable for drain disposal, then filter the solution through a bed or column of activated charcoal or ion exchange resin. Follow the manufacturer's directions for the filter's proper use. The following filter kits are examples of products available:

Company Name	Product Name	Product Code	Phone Number	Website
Amresco, Inc.	Destaining Bags	E732	800-829-2805	www.amresco-inc.com
BD Biosciences-Clontech	BondEX Detoxification Cartridges	K3080-1	877-232-8995	www.clontech.com



VWR International	Extractor Waste Reduction System	28165-500	800-932-5000	www.vwrsp.com
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- 3. DETECT:** If ethidium bromide (EtBr) was utilized as the organic fluorescence dye, utilize ultraviolet (UV) light to observe its presence in the filter effluent.
- 4. RE-FILTER:** If EtBr is still present in the effluent, then re-filter the solution. Please note that this may be an indication that the filter may be spent and need to be replaced.
- 5. FLUSH:** If EtBr is not observed in the effluent, then discharge to a sink drain with copious amounts of water.
- 6. DISPOSE:** Dispose of the spent filter cartridges/resins in the Electrophoresis Gel 5-gallon pails. Once containers are 75 – 80% full, complete and submit the waste request via the [Salute](#) form available on the EHS website.

Treatment via Chemical Detoxification for Ethidium Bromide Only

Spent buffer solutions containing ethidium bromide (EtBr) in very dilute aqueous solutions that are free of other contaminants (e.g., heavy metals), can be chemically treated and disposed of via a sink drain. This process converts the ethidium bromide to the physiologically inactive product, 2-carboxybenzophenone, with chlorine bleach.

- 1. DETERMINE:** Utilize WCM's [Drain and Trash Disposal of Chemicals](#) procedure to determine if any of the spent buffer constituents other than the EtBr are not acceptable for drain disposal (e.g., heavy metals.) **If a spent buffer contains any constituents other than the ethidium bromide, which are not acceptable for drain disposal, then do not treat the waste.** Manage the spent buffer solution as hazardous waste and submit it to EHS for disposal as established in WCM's [Chemical Waste Disposal Procedures](#).
- 2. ACCEPTABLE:** If the spent buffer solution contains only constituents, excluding the EtBr, which are acceptable for drain disposal, then collect the buffer solutions into a sealable bottle/container. The bottle must remain sealed/closed at all times except when immediately adding or removing wastes from the bottle.
- 3. LABEL:** Label the collection bottle "Spent Buffer Solution with Ethidium Bromide & Bleach."
- 4. BLEACH:** For each 10 mg EtBr per 100 ml of solution, add 100 ml of household bleach. (*Bleach deteriorates over time upon exposure to air. If in doubt about the quality of the bleach, use an excess amount and stir overnight.*)
- 5. STIR:** Stir at room temperature for 4 hours.
- 6. DETECT:** Utilize a UV light to observe the presence of EtBr.
 - If EtBr is still present in the effluent, re-treat the solution.
 - If EtBr is not observed, then continue.
- 7. pH ADJUST:** Check and adjust the pH of the waste solution utilizing either sodium hydroxide or potassium hydroxide so that the resultant solution has a pH greater than 5.0 and less than 11.0.
- 8. FLUSH:** Flush waste solution to a sink drain with copious amounts of water.

SPILLS

All spill response activities are to be conducted as detailed in EHS Program Manual [4.3 - Chemical Spill Planning and Response](#).

References

- Armour, Margaret-Ann. Hazardous Laboratory Chemicals Disposal Guide, 3rd Edition.
- EHS Program Manual, [Chemical Waste Disposal Procedures](#)
- EHS Program Manual, [Section 4.3 - Chemical Spill Planning and Response](#)
- Salute Safety, https://ehs.salutesafety.com/users/sign_in